

## **Change Orders Ordeal: The Output of Project Disintegration**

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### **Abstract**

*Change orders are one of the most controversial issues in construction contracts and require successful negotiations to avoid claims and possible litigation. Contractors, owners and architects behave differently when dealing with change orders. The aim of this paper is to demonstrate that change orders are the natural result of the disintegration of design and construction, which started in the US in 1893 with a Congressional Act formally separating the design and construction phases of a capital project. Delivery methods such as Design-Build (DB) and Construction Management at Risk (CMR), which are designed to mend the missing integration of design and construction and, consequently, eliminate the existence of change order conflict are proposed to recover the level of integration that existed at the time of the master builder.*

**Key words:** change orders, project integration, design-build, delivery methods

### **1. Introduction**

Change orders in construction are one of the most controversial issues to manage and a challenge to project management to satisfactorily resolve any change in order to avoid claims. Any construction contract is signed under the principle of “good faith,” which means that the parties will trust each other to perform according to the contract and that the contract is fair with no intention of taking advantage of the parties during the life of the contract. However, as soon as the contract needs to be modified by generating a change order, the behavior of the parties changes in relation to the initial “good faith” environment. By its nature, change modifies the comfort zone of an individual who will react according to his or her core values. Change orders in construction usually change the behavior of key project players such as Owners, Architects and Contractors. Lack of trust between the parties appears to be a dominant drive generating adversarial perceptions about the level of honesty between the parties.

Traditionally, it seems that a battle exists between the Owner/Architect and the Contractor in the construction industry. This is true especially if the contract delivery method is the design-bid-building (DBB), in which owners behave to protect themselves given the possibility of contractors taking advantage of change orders by charging more for their services. Contractors behave with the aim to protect themselves by not providing services without being rewarded due to change orders. Finally, architects behave in such way to protect the project integrity without cost generation to them. All three actors’ behaviors are related to money, with the objective of maximizing profits and minimizing losses. These objectives are not wrong; what is wrong is the existence of a project management process that fails in reaching a satisfactory solution to resolve change orders. If project management can successfully manage the behavior of the parties involved in order to reach a negotiated solution, change orders will be perceived as value added in the project. If project management fails in that mission, the possibility of generating a claim and future litigation is high. One of the solutions proposed to minimize change order conflicts is to select one of the design-build (DB) or Construction Management at Risk (CMR) project delivery methods in which change orders are treated as a learning tool for the DB team to reach the desired quality level of project design. However, not all projects use the DB or CMR methods. The first logical question to be addressed is why change orders exist in a construction project.

### **2. Change orders in construction projects**

It is amazing to see an automotive assembly line in which the vehicle base moves towards the parts that are ready to be assembled by robots or humans, and in mere moments the final product is ready.

The manufacturing process replicates the design mechanically without variability and consequently no change orders are born. On the other hand, the construction process is exactly the opposite of the automotive assembly line. The final product is at a fixed point and all the parts need to be moved to the designated construction site to be assembled by humans who will use equipment or their own force. For this reason, the construction process imposes a large number of variables to control which requires more management throughout the construction process. Change orders can be born depending on the level of integration of design and construction. The increase in variables to be managed is not the root cause for change orders in construction. Change orders correlate more with the degree of integration of the project associated with the project delivery type.

Change orders are non-existent when construction is delivered under the master builder concept due to the total integration of the project. The master builder serves as both project designer and builder resulting in the completion of very complex projects that come to existence without the use of change orders. Change orders in construction are a consequence of the lack of integration between design and construction and began when construction contracts started to use the two-step project delivery method designated as DBB. The project disintegration became evident and change orders became the accepted norm to close the gaps generated by this disintegration.

In the United States, the DBB delivery method began with the rise of professional societies in the 1850s and was followed by key legislative events that resulted in the formal separation of design and construction. The most relevant benchmarks to enforce separation of design and construction sorted by date (FHWA, 2006) and author are:

- 1893: Congressional Act formally separated the design and construction phases of a capital project.
- 1926: Omnibus Public Buildings Act required all capital project plans and specifications be completed and approved before the construction phase can begin.
- 1935: The Miller Act separated design and construction by requiring government contractors to post surety bonds.
- 1947: Armed Services Procurement Act required that architectural and engineering (design) services be procured on a negotiated basis, while construction services continued to be procured through a formal advertisement and low bid selection process.
- 1949: Federal procurement legislation extended the 1947 Armed Services Procurement Act requirements to all federal civilian agencies.

With the separation of design and construction, the gaps in communication between the parties of the project increased. Project adjustments that, were used as part of the learning curve to deliver better projects at the time of the master builder process, were transformed to change orders in the DBB process project. However, one of the characteristics of the DBB process is that it may lack clear lines of accountability for errors, omissions, re-work, over-run and delays. Thus, research identifies several causes for the initiation of change orders and different solutions are proposed to mitigate the problem.

Kadefors (2004) states that changes are frequently made in contract documents during the construction phase. Drawings and specifications always contain errors and omissions that need to be corrected, and changes in user needs or market demand often modify client preferences. Weather, soil conditions and failures in the supply of resources may also alter priorities. Chen and Hsu (2007) identified 17 reasons for change orders such as additions, deletions, design changes, design errors, design coordination, changes in code, technique changes, manpower, material/equipment, over-inspection reworking, scheduling, cleanup, value engineering, unknown conditions, weather, and other special reasons. Unfortunately, in a poll of 340 projects, management failed to solve the problems by negotiation which resulted in litigation. Naoum(1994) identifies lack of communication and integration of the project team as drivers of change orders.

According to Ibbs et al. (2001), changes in projects are common and may be deleterious or beneficial. For this reason, they suggested a systematic change management system with five steps that stress the need for integration and good communication to implement a change order.

By the 1980s several movements began with the goal to reestablish project integration that had previously been lost by the inherent disintegration of design and construction in the DBB process. New delivery methods and services were developed with an aim to increase project integration.

Delivery methods that involved just one contract with one entity to provide the services of design and construction were the ones that enhanced integration in the project. The Design- Build (DB) is one of the best methods of design and construction integration; it recovers the master build concept in construction and changes are viewed as improvements on the project. In terms of services BIM is defined (Young ,2007) as a tool that focuses in design and construction integration.

### **3. Contractor's perspectives**

Change orders can promote different behaviors in contractors. If a contractor is selected based on low bid analysis, change orders will be perceived as one window of opportunity to increase profit in the contract, and for this reason the contractor will search extensively to find justification to start a change order. If a contractor is selected based on the unit costs and quantities of the original design, change orders will be perceived as a possible rupture in contracted price. Uncertainty will then influence the contractor's behavior. Some contractors behave cooperatively when change orders are initiated, while others behave negatively, showing resistance to comply with change order requirements. Kegan and Lahey (2001) state that resistance to change does not reflect opposition, nor is it merely a result of inertia. Instead the person is applying productive energy toward a hidden competing commitment that creates a personal immunity to change. The project environment can transform the immunity to change into a positive behavior towards changes by continuously displaying videos, displays, or designs so that contractors can process an enormous amount of complex information instantly. The rationale behind this statement is based on the expected need of all project participants to increase knowledge of the contract. Lack of project integration and contract language are some of the barriers that block the complete understanding of construction contracts. The use of extensive legal language allows room for dual interpretations, which automatically reduces the level of communication between project actors.

One solution to increase clarity in construction contracts is offered by the Design Build Institute of America (DBIA). They designed a set of construction contracts with the aim of increasing communication between the parties involved in a project. The contracts are concise, clear and use a language that all parties of the project will understand without the help of legal expertise. In terms of length, the DBIA General Conditions document # 535 (DBIA, 2010) has 23 pages versus the 44 pages of the traditional AIA General Conditions document.

### **4. Owner's perspectives**

The behavior of owners towards change orders correlates greatly with the level of integration of a project and the level of trust among project players. Projects with a low level of integration will naturally generate a high level of change orders that can be classified as additions or deletions of the scope of work. For any case of change order, the owner's behavior will be defensive and the level of defense will depend on the level of trust between owner and project players. According to McCarthy (2008) the owner will behave progressively and be restrictive toward making change orders. Change orders breed division between the owner and/or the architect attempting to get money back from the contractor.

In projects with a high level of integration, especially those where design and construction is done by one entity, the risk of change order generation is totally shifted to the design build entity that will treat changes as project improvements and part of the learning curve process. In that case, the owner's behavior is cooperative during the development of the project. If the owner calls for addition his behavior will be also be cooperative, with the attributes described (DBIA, 2011) as providing reviews and approvals of the design, supporting and collaborating with sense of urgency, staying engaged during project development and execution to meet owner's objectives, making timely decisions, and establishing performance requirements.

One of the best benefits the DB delivery method offers to owners is the warranty that the project cost will not increase due to change orders as well as the elimination of possible litigation in the case of non-resolved change orders. (Interface Consultants (2011) indicated that claims are the root cause for change orders in construction projects. They state that a claim is an unresolved change order and indicate 10 actions those owners or owners' representatives should be aware of to avoid claims. They are: (1) failure to make the site available at the time and in the condition required by the contract, (2) ordered extra work, (3) ordered delays and suspensions, (4) delayed approval of contractor submissions, (5) defects or delays in owner furnished items, (6) errors or inadequacy of the contract documents, (7) failure to coordinate work of third parties, (8) failure to grant or delay in granting legitimate time extensions, (9) unreasonable or mistakes inspection and (10) interference with the contractor's method or sequence of work.

As can be observed, all claims described by Interface correlate with the lack of project integration, adequate communication and trust between the parties of the project.

### **5. Communications**

Literature indicates that lack of communication is directly correlated with unsuccessful management of change orders (Naoun, 1994, Ibbs et al., 2001). For this reason, it is the responsibility of management to create an environment of clear communication in all aspects of the business by promoting the concise understanding of all specifications and requirements of the project. Questions for clarification should be welcomed and encouraged. Management should have a genuine interest in helping clarify any issues for the benefit of the project.

Continuous conversations, review of change order contract requirements, and change order status should be a permanent agenda item at the project meetings with an aim to motivate contractors to expedite their change order proposals on time. Management should recognize contractors who are up to date and offer help for those who are late. This creates an atmosphere of total collaboration with the focus always on the benefit to the project.

In order to increase communications in a project change order, proposals should include the appropriate breakdown of labor, materials, overhead, and profit using the same unit costs as listed in the project proposal. This practice will increase the level of trust between the parties and accelerate the change order approval. The old tradition of offering a change order proposal with a lump sum value without the adequate breakdown promotes a lack of ethical behavior and decrease in trust among the parties.

Feingold (2011) suggests that all field change order estimates should include the following breakdown: (i) the cost of the change including subcontractor take-offs and time sheets reflected in the field change authorization; (ii) any resulting increase or decrease in the contract price; (iii) the agreed-upon cost for subcontractor overhead and profit of the cost for the labor and materials reflected in the proposed change order(s); and (iv) any changes in the work and/or project schedule which would result from implementation of the field change authorization.

Change order proposals should include a breakdown for labor and material at the level of unit value, amount of hours to execute the proposed change per each trade, cost per hour for labor for each trade, and cost/quantities for each material. The subtotal should then be added to the overhead and profit.

Another contractor behavior related to the lack of communication and low level of cooperation in dealing with change order proposals is that expressed in the statement, "If the owner wants my work he needs to pay what I want!" In these cases management needs to show contractors that they are in a competitive market and the owner will be pleased to reward him if the proposal is fair. Contractors as service providers are in business to please the owners since owners are the basic reason for contractors' existence.

The lack of communication and cooperation to provide change order proposals on time is observed in some cases, even in the era of electronic communication in which drawings are delivered electronically. The old excuse, "I have not received the drawings of the change order yet," used as justification for delay of change order proposals does not apply anymore. This attitude should be discouraged by management in order to increase clear communication between the project players.

### **6. Design and Construction Integration**

When analyzed under the master builder concept, the term design and construction integration means that design and construction services are delivered by a single entity. In that case, improvements in the design and constructive methods are natural consequences of the thought process towards achieving excellence in the project. Adjustments required in the project will be solved by the sole entity with no generation of change orders. Under this concept, construction projects that are contracted to be delivered with separation of the design and construction services will begin with disintegration and consequently change orders will be generated to cover the gaps produced by this congenital disintegration, for example the DBB method.

In order to recover the original design and construction master builder concept of integrated projects, delivery methods like construction management at risk (CMR) and design-build (DB) were developed in different arrangements. In comparing CMR and DB in terms of level of integration, the DB method has a better structural architecture which provides a short delivery time than the CMR method.

## **7. Conclusions**

1. Owners, architects and contractors behave differently toward the management of change orders. Behaviors can be displayed across the spectrum of full cooperation and full resistance.
2. The best way to manage change orders is to reach a negotiated solution between the parties involved in such a way that change orders can be perceived as value added to the project and increase communication and trust in the project environment. The lack of negotiation will lead to a claim and probably will end in litigation.
3. The initiation of change orders in a construction project is highly correlated with the level of integration of the services of design and construction, and they are a natural consequence of the gap created by the disintegration of design and construction services.
4. The DBB delivery method is considered the method that provides a high level of disintegration between design and construction when compared with the master builder concept, and consequently the delivery method that generates change orders naturally.
5. New delivery methods such as CMR and DB are designed to provide project integration between design and construction and, due to this integration, the risk of change orders is shifted to the design build entity that will treat changes as improvements of the project as part of the learning curve.

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